Initialization or Memory management ...

fan 25 posts since

Apr 16, 2008

Hi, LIS group:

I encountered this problem, please see details and figures in the attached PDF file. I have made a lot of effort to make sure the domain setup and all input data are correct. Finally, the problem is narrowed down a lot, but still need help from you to guide me tracking down the codes. I hope it is just a small fix to some of you experts. FOR your reference, the lis.config is also attached.

Thanks,

Xingang **Attachments:**

- LIS short wave downward flux problem.pdf (113.6 K)
- lis.config (11.1 K)

geiger *19 posts since*
Sep 20, 2007 1. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 24, 2008 1:58 PM

Hello,

Have you plotted all your parameter data to verify that they are correct? (land mask, vegetation type, soils, LAI/SAI, etc.)

Jim

fan *25 posts since*
Apr 16, 2008 2. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 24, 2008 3:39 PM

in response to: geiger

Jim:

Thanks for the reminder. All the parameter fields look fine. I have compared the model output parameters with original data, except for the vegtype, they are all correct. Vegtype looks very reasonable too.

Please see the attachec figures.

Xingang **Attachments:**

- LandmaskVegtype_plots.pdf (221.0 K)

sujay *118 posts since*
Sep 20, 2007 3. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 24, 2008 4:31 PM

in response to: fan Xingang,

question on the soil color data that you are using (soicol_12.5KM.1gd4r) : Is it global or is it confined to the statsgo domain?

-S

fan *25 posts since*
Apr 16, 2008 4. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 24, 2008 4:40 PM

in response to: sujay

Sujay:

It is global data. The LIS model output of params for soil color is consistent with what I see from the global data (from plot).

I did try to make it for STATSGO area, and used read_statsgocolor.F90. Had the same problem. Now, I changed to use FAO global data and use the original coding to read it, i.e., use read_faocolor.F90.

Xingang

sujay *118 posts since*
Sep 20, 2007 5. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 24, 2008 4:44 PM

in response to: fan Okay thanks. Can you show us your control file that you are using to view the output?

-S

fan *25 posts since*
Apr 16, 2008 6. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 24, 2008 4:47 PM

in response to: sujay

They are attached.

Xingang **Attachments:**
- output_NR0.ctl (3.2 K)
- out_params_NR0.ctl (675 bytes)

geiger *19 posts since*
Sep 20, 2007 7. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 24, 2008 5:04 PM

in response to: fan Hello,

Would you please post your CLMstats file found in your OUTPUT_NR0 directory?

Would you please plot swnet, lwnet, and qle at 03z02mar2000?

Thanks,

Jim

fan *25 posts since*
Apr 16, 2008 8. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 9:38 AM

in response to: geiger

Here they are. These are at 3UTC 2000-03-02. The strange pattern along the top of the domain is also seen from many other model calculated fields at 15 UTC. I am still thinking about why swdown from forcing problem happens only at 00 UTC.

Thanks a lot for any of you who looks into this problem!

Xingang **Attachments:**

- CLMstats.d01.stats (159.8 K)
- Swnetlwnetqle.pdf (69.9 K)

sujay *118 posts since*
Sep 20, 2007 9. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 10:07 AM

in response to: fan Xingang,

I couldn't find anything wrong in these setups. So I think we need to try to replicate your problem. Can you please give us a tarball of your parameter data so we can try to run this case ourselves?

(Please do not upload the data here..)

-S

geiger *19 posts since*
Sep 20, 2007 10. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 10:15 AM

in response to: sujay Hello,

Would you also post your lisdiag_nr0 file?

Thanks,

Jim

fan *25 posts since*
Apr 16, 2008 11. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 10:36 AM

in response to: fan

Problem solved!

Great thanks to Georgy who has helped find out the exact place to fix the problem!

Also thank you for your time and looking at this problem.

Solution:

In the program LIS/src/baseforcing/nldas/retnldas.F90:

Chang lines 223-225 from:

if(f2(c).ne.-9999.0) then

f(c,iv) = f2(c)

endif

To:

if(f2(c).gt.-999.0) then ! Just use a more relaxed condition

f(c,iv) = f2(c)

else

f(c,iv) = 0.0

endif

This is the place that NLDAS swdown is dealt with separately from other variables. The array f(c,iv) is filled with data where f2 is non-missing, but left out the missing points unfilled.

==========

Two more questions that are related to using NLDAS data, hope Sujay or anyone else could provide clarification!

1) What impact will be added to LIS results IF short wave radiation is missing in the forcing dataset for the daytime periods? Does LIS model manage to provide any estimate? I found swdown is missing for the day 2000-01-01, but have no idea if this happens any other times in the dataset.

2) Needs Clarification: In the testcase for NLDAS baseforcing, the elevation correction is used (see the lis.config in that directory). I heard of (but not very clearly known) that elevation correction has been applied for NLDAS data (only this forcing source). Should we use elevation correction or not?

Thanks,

Xingang

geiger *19 posts since Sep 20, 2007* 12. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 10:50 AM

Hello,

Thanks for the work around, but you should not set f = 0 in your else statement.

We are checking the NLDAS forcing data to see if it is corrupted at this time-step.

Jim

geiger *19 posts since Sep 20, 2007* 13. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 12:46 PM

Hello,

We do not see a problem in our copy of the NLDAS data. Would you please redownload the data for 2000-03-02 and try one more time?

Thanks.

sujay *118 posts since*
Sep 20, 2007 14. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 12:49 PM

in response to: fan Xingang,

I ran a testcase using your domain, and I didn't see the issues that you faced. The undefined value after degribbing is always -9999 So I am wondering if you got a bad file at this particular time?

What the code does here is overwrite the eta data with the GOES data. So you are guaranteed to have valid data (from Eta at least). We have done decadal runs with the NLDAS data and have never seen a gap.

Please see my new post on the NLDAS elevation correction usage, since many folks have asked about this.

-S

fan *25 posts since*
Apr 16, 2008 15. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 1:23 PM

in response to: sujay

Sujay and Jim:

With the original code, I ran tests for three time periods, Jan 1-7, Mar 2-8, Jul 1-7 of 2000. They all showed the problems in the output, from which I started this discussion. With the changed code, they are all ok now. As explained by Sujay, I agree with Jim that we should not set f=0, but, for now, I don't know what it should be. If this step is to overwirte Eta with GOES (Do you mean to overwrite something with the NLDAS data that is read in?), is there any possilibity that the original array to store Eta data has initialization problem?

Setting f=0, for all the grid points that in reality do not have any short wave radiation, is OK. I have compared the LIS output of forcing swdown with NLDAS plots; and they looks the same. However, setting f=0 will cause problem if NLDAS data does have missing value for daytime grid points.

The NLDAS's missing daytime data problem I reported is only for the one day, Jan. 1st, 2000. All other dates I have tested are all right (checked by displaying all the plots). Sorry for any confusions.

Xingang

sujay *118 posts since*
Sep 20, 2007 16. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 1:30 PM

in response to: fan Xingang,

For obvious reasons, f=0 is not a safe fix. Can you print out what values you are getting for f2(c) that are different from -9999 ? As I said before, either your data is corrupted or your degribbing (getgb) is giving you a different undefined value other than -9999

-S

fan *25 posts since*
Apr 16, 2008 17. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 25, 2008 6:16 PM

in response to: sujay

Sujay:

I downloaded the data again, and it is exactly the same as those I have used. From displaying NLDAS data of original grib format, the missing values are -9999. By printing the F and F2, it is shown that the model reads data correctly, the missing data is -9999.

I have carefully read the program retnldas.F90 under directory LIS/src/baseforcing/nldas/. In this program, both F and F2 are allocated and deallocated locally. They are both used to store degribbed variables. F will finally hold all 9 variables in this routine, and F2 is used only for short wave radiation. The original code put non-missing data in F2 into F, and therefore left the F be undefined at those points where F2 indicates missing values.

There are two options to fill up F(c,3) here (3 identifies short wave in this array). One is zero, one is undef. I checked the following interpolation routines that are called to put F onto LIS grid, undef seems not to be included in data to be interpolated (e.g. bilinear-interp). I don't know where, as you mentioned, there will be other data sources to fill up when NLDAS is missing.

Xingang

sujay *118 posts since*
Sep 20, 2007 18. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 26, 2008 1:35 PM

in response to: fan Xingang,

Thanks for the additional info. I still don't understand how your fix is working.

if(f2(c).gt.-999.0) then

f(c,iv) = f2(c)

else

f(c,iv) = 0

endif

This implies that at some point your f2(c) is becoming -ve, but not -9999.0 But when you printed the f2 values, they all come out to be -9999?

Since I was unable to replicate your problem with a similar run at 1/4 degree, I would like to try your exact setup. Can you please share your input parameter data?

-S

fan *25 posts since*
Apr 16, 2008 19. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 28, 2008 12:11 PM

in response to: sujay

Sujay:

I think the change in the IF condition has caught too much of your attention. The problem was fixed not because of the change in IF condition, but in the ELSE part, which was missing in the original code. As you can see from the attached figures, the correct forcing SWDOWN should be zero in the eastern part of the domain, where the original NLDAS data is filled with -9999. The original code does not fill anything to this area because F2=-9999. F is allocated locally and is not initialized, so F will be filled with any values left at the allocated memory.

NOTE: the figures of "after fix" in the attached file were from using this IF condition: if(f2(c).ne.-9999.0) which is the same as in the original code. The differences in the attached figures were from using or not using "else; f(c,iv) = 0.0".

From the programming habit of LIS, I see such IFconditions as (r.eq.9.0) or (r.ne.9.0). This seems work fine in F90. From my and some others' experience, I myself prefer not to use exact comparison for real numbers in Fortran programming. An alternative could be (ABS(r-9.0).gt.1E-10) in stead of (r.ne.9.0), which could avoid computer rounding errors on some machines. Sometimes, for undefined values as -9999., in cases that I know there will not be any negative values or there will not be any negative values less than e.g. -999., using (r.gt.-999.) or (r.gt.-9998) is an easy way than calling an intrinsic function (e.g. here ABS( )).

If you would like to conduct a test, I have put the parameter files and lis.config at my ftp site:
ftp://ftp.hpc.msstate.edu/outgoing/fan/For_Sujay

Thanks,

Xingang **Attachments:**

- ttt.pdf (171.9 K)

sujay *118 posts since Sep 20, 2007* 20. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 28, 2008 1:25 PM

in response to: fan Xingang,

Thanks for the data. I ran a test and was unable to reproduce the problem. which platform/compiler are you using?

Here is my take your comment:

You are correct that the original code does not fill anything in the area when F2 is -9999.0 (which it should be). So the F values should default back to the eta (which also can be -9999). When the code finally interpolates the input F value, it distinguishes between valid and invalid points based on the mask you get from the getgb call. So I believe you are not getting the correct mask from the getgb call, which causes some -9999s to be included in the interpolation. So again, setting the f = 0 in the ELSE part is incorrect.

Yes. you are right about the checking for real number equality in the code, though I don't think that's the case here since your code with if(f2(c).ne.-9999.0) is working.

-S

fan *25 posts since Apr 16, 2008* 21. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 29, 2008 3:53 PM

in response to: sujay

Sujay:

I don't know how you checked your results. The problem should be very obvious if you can display LIS output forcing parameter swdown at 00 UTC either on the 3rd or 4th of March. If the plots are different from the top 2nd and the 3rd figure in my ttt.pdf (above), the problem exists.

By the way, I am running on Linux machine with PGI compiler. ALSO, the problem has been reproduced by Yan on her machine with ABSOFT compiler.

I have a different understanding about your statement " (which it should be). So the F values should default back to the eta (which also can be -9999)". This might be true somewhere in the LIS system (I am not digging into that now), BUT not here when reading NLDAS data in retnldas.F90. What this program does here is to read NLDAS data, let's just focusing on short wave radiation flux, which is iv=3. The degribbing routines get swdown into array F2. Then, it is put into F(:,3). Right following that, interpolation to LIS grid is performed, where no other data is involved (such as Eta stuff you mentioned), except F and LB. LB is bitmap information from grib data files. From my output, LB is a mask of land (=.true.) and ocean (=.false.), see the attached plot. LB never changes for all the times when swdown is read. Obviously, there do exists missing or zero short wave over land points (nighttime). So, if you only fill the F with non-missing values (i.e., .ne.-9999.), You are allowing random odd values (from computer memory) in the F participating in interpolation over land, unless what you got for the mask from getgb call is exactly the same as F2 data distribution. For your info, I attach two plots showing what's in F before assigning any values.

My point: *F must be initialized* with **something** and not partially, here in this particular program retnldas.F90, unless you work around somewhere else. Zero works if we trust that NLDAS data won't have missing times (I mean missing values in daytime, it happened on 1/1/2000). -9999.0 works if we modify the interpolation or the mask that is currently obtained from grib data file, so that interpolating F onto LIS grid won't include this undef value.

Xingang **Attachments:**

- LB_F2.pdf (125.5 K)
- odd.pdf (91.6 K)

sujay *118 posts since*
Sep 20, 2007 22. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 29, 2008 8:31 PM

in response to: fan Xingang,

I did some more tests and I think the real problem is that your eta background fields (F) are not getting read properly. In my run, my f values are already zero from the getgb run. So there is no need for an explicit f(c,iv) = 0 (I said this doing this explicitly in the code is incorrect because there are instances where GOES data is missing so you don't want the code to default back to 0..).

So what values are you getting for F when F2 is -9999.0 ?

-S

fan *25 posts since*
Apr 16, 2008 23. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 30, 2008 12:02 PM

in response to: sujay

Please read the following section of the program (in retnldas.F90):

allocate(f(nldas, iv_total))

allocate(f2(nldas))

```
do
iv = iv+1
if ( endloop == 1 .or. iv == 10 ) exit
.......
if(iv.ne.3) then
call getgb (lugb,lubi,nldas,j,jpds,jgds,kf,k,kpds, &
gridDesc,lb,f(:,iv),gbret)
elseif( iv == 3) then ! downward SW radiation
jpds = -1
jpds(5) = 204
jpds(7) = 0
jpds(2) = 154
call getgb(lugb,lubi,nldas,j,jpds,jgds,kf,k,kpds, &
gridDesc,lb,f2,gbret)
do c=1,nldas
if(f2(c).ne.-9999.0) then
f(c,iv) = f2(c)
endif
enddo
endif
```

For iv==3, F never gets values from getgb. It is waiting for input from F2. (For other variables, F gets values through getgb call)

When F2 is -9999., F has (and already had) the values as shown in the above attached figures in odd.pdf.

Xingang

fan *25 posts since Apr 16, 2008* 24. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 30, 2008 12:10 PM

in response to: fan

Sorry, the preceeding spaces of Fortran statements were removed when the message was posted.

One possible reason of F already been zeros is some compiler may automatically initialize variables as zero.

Please notice that the problem has been reproduced on other computer/compiler at another institution.

Xingang

sujay *118 posts since Sep 20, 2007* 25. **Re: Initialization or Memory management problem? w.r.t. short wave flux** Apr 30, 2008 12:20 PM

in response to: fan Okay.. I guess that explains it. This is a bug that is somehow got introduced into the public version of the code.

This should be replaced as follows:

```
if(iret==0) then
call getgb (lugb,lubi,nldas,j,jpds,jgds,kf,k,kpds, &
gridDesc,lb,f(:,iv),gbret)
if( iv == 3) then ! downward SW radiation
jpds = -1
jpds(5) = 204
jpds(7) = 0
jpds(2) = 154
call getgb(lugb,lubi,nldas,j,jpds,jgds,kf,k,kpds, &
gridDesc,lb,f2,gbret)
do c=1,nldas
if(f2(c).ne.-9999.0) then
f(c,iv) = f2
```

I have updated the repository. Please run svn update and hopefully this will fix your problem.

-S